Tactical Edge Networking (TEN) Naval Aviation Perspective

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N783, Network Systems Requirements

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Communications and Networking Program Requirements

❑ Align naval aviation to provide network-centric capabilities across platform and service domains

  – Shorten the kill chain

  – Provide the *right* Common Operational and Tactical Picture (COTP)

❑ Tactical networking mitigates threat and safety risks

  – Enhance lethality through more efficient application of force

  – Reduce fratricide through a completely netted force

  – Improve force integration through interoperability

❑ The Challenge

  – Build and integrate a dynamic, interoperable network at the Global Information Grid (GIG) tactical edge

    • Intra-service and inter-service data exchange incompatibilities impede interoperability

TEN Fundamental Elements

❑ Networking radio, router, and waveform
  – MIDS-JTRS, Airborne Automated Digital Networking System (aADNS), Tactical Targeting Networking Technology (TTNT), etc.

❑ Open Architecture (OA) distributed computing

❑ Common Data Model / translator
  – Extensible Markup Language (XML) / efficient XML, Common Link Integration Processing (CLIP), etc.

❑ Network Services
  – Orchestrate delivery / retrieval of information
    • Publish & Subscribe, Quality of Service, Information Assurance, GIG Reach-back, etc.
  – Protocol refinement

❑ Mission applications
  – Joint Mission Planning System (JMPS), Network Centric Collaborative Targeting (NCCT), Joint Track Manager (JTM), etc.

Platform Integration

Network Performance Characteristics

❑ Provide monolithic digital information exchange and collaboration among heterogeneous systems

❑ Highly automated network services and management to support rapid:

– Dynamic, secure, self-organizing resource (platform) and data (information) discovery

  • Network entry / egress
  • Establishing information exchange relationships based upon operator needs

– Bandwidth and throughput allocation / re-allocation

– Domain transition

  • Between Wideband Networking Waveform (WNW), Soldier Radio Waveform (SRW), Airborne Networking Waveform (ANW), Weapons Data Link (WDL)

❑ Compatible with existing network systems

TEN Products

❑ Waveforms
- – TTNT flown successfully in recent demonstrations
- – Planning for Joint Expeditionary Force Experiment (JEFX) 06

❑ Radio
- – JTRS is the desired radio
- – TTNT includes an existing RF component plug and play with existing MIDS-LVT
- – VRC-99

❑ Routing
- – ADNS / aADNS
- – Non-IP (MANET routing)

❑ Protocol
- – NRL, DARPA, and commercial entities developing Mobile Ad Hoc Network (MANET) protocols
- – Requires integration of a complete network stack in edge user platforms

TEN Products

❑ **Common Data Model**

- XML and eXML
  - Readiness is mature (will need some adaptation for MANET protocol)
  - Requires agreement among the joint service tactical edge users

❑ **Processing Environment**

- OA / Modular Open System Architecture (MOSA) distributed computing environment
  - COTS based computing hardware to process the network services and mission applications on-board the tactical edge user platforms.
  - These initiatives are mature for <u>demo</u> for F/A-18F-1, F-15E1, and E-2
- Includes Application Program Interfaces (API) and common data models allowing the OA computing data to be translated by existing Operational Flight Programs (OFPs)

TEN Products

❑ Mission Applications

– Employ readily available commercial programming software for a COTS based processing environment

– Examples:

- ATO based upon E-2 Airborne Operational Decision System (AODS)

- Rapid Attack Information Dissemination Execution Relay (RAIDER), FalconView, chat, imagery transfer, Blue Force Situational Awareness (BFSA), JMPS, NCCT, etc.

TEN Products

❑ Network Services
  - Leverage commercial technologies and OA to build network services
  - Software supporting P2P / MANET protocol, data transport, discovery, etc. and management/orchestration
  - Must leverage or be compatible with NCES
  - Identify:
    - Software/middleware
    - Protocols supporting peer-to-peer collaboration and MANET routing
    - Common computing platform hosting distributed TES
    - Wrapping data for transport/automated transport protocol selection
    - Resource/data discovery
    - Management application orchestrating the services and bandwidth/throughput allocation

TEN Operational Benefits

- ❑ Direct peer-to-peer platform collaboration
  - – Naval Integrated Fire Control-Counter Air (NIFC-CA)
  - – Network Centric Collaborative Targeting (NCCT)
- ❑ Disseminate higher-quality information throughout transformational and legacy networks
  - – Provide more users better track data leveraging Cooperative Engagement Capability (CEC) and similar high-quality closed loop systems
- ❑ Facilitate domain transition
- ❑ Imagery dissemination
  - – Framed imagery and streaming video to support cursor-on-target, etc.
- ❑ Automated mission applications
  - – JMPS
  - – Air Tasking Order (ATO)
- ❑ Operator chat / chat rooms
- ❑ Interface with other agencies
  - – Federal / local emergency services

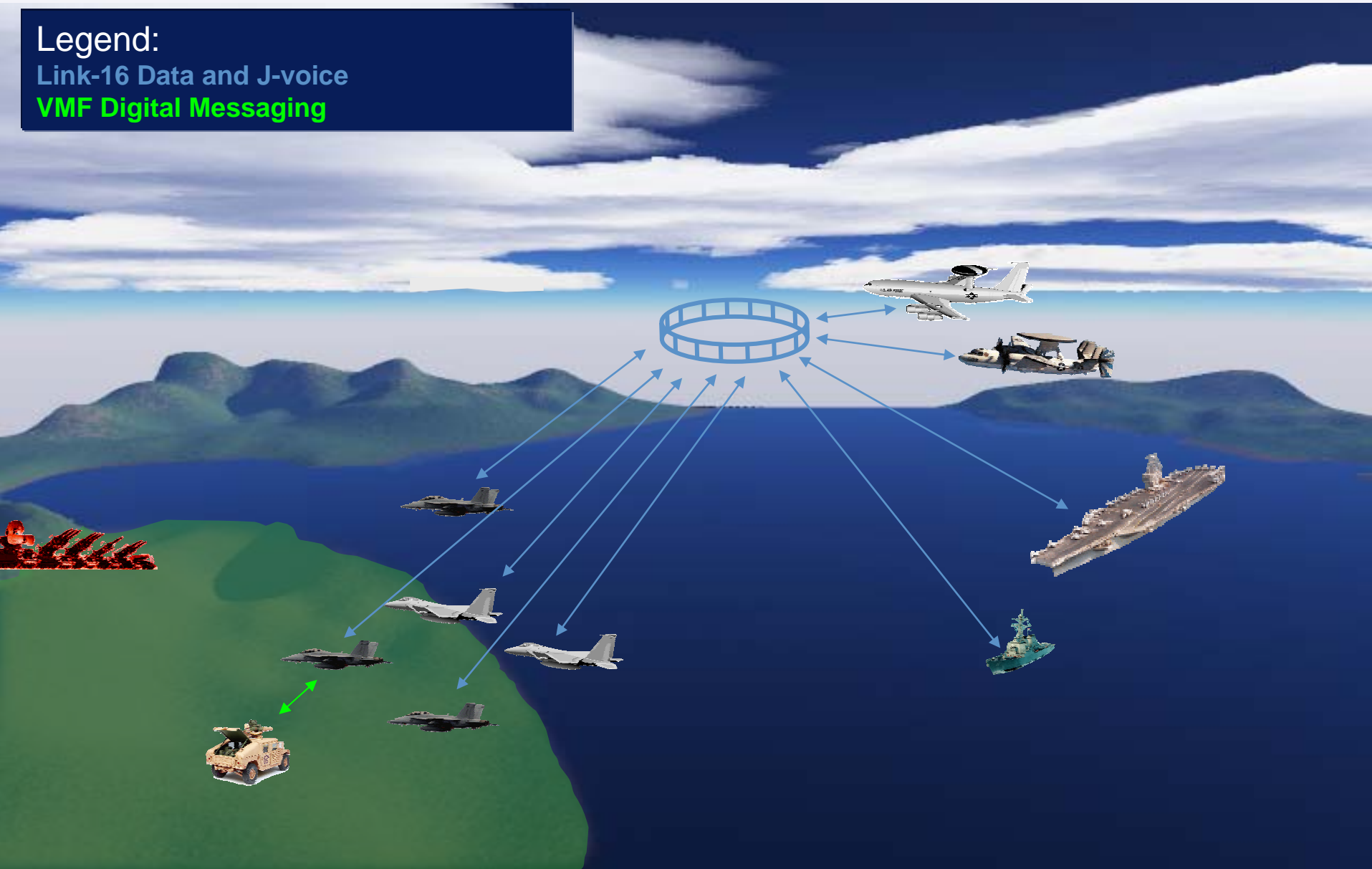**Kill faster and ease operator workloads**

Today's Tactical Edge

Legend:
Link-16 Data and J-voice
VMF Digital Messaging
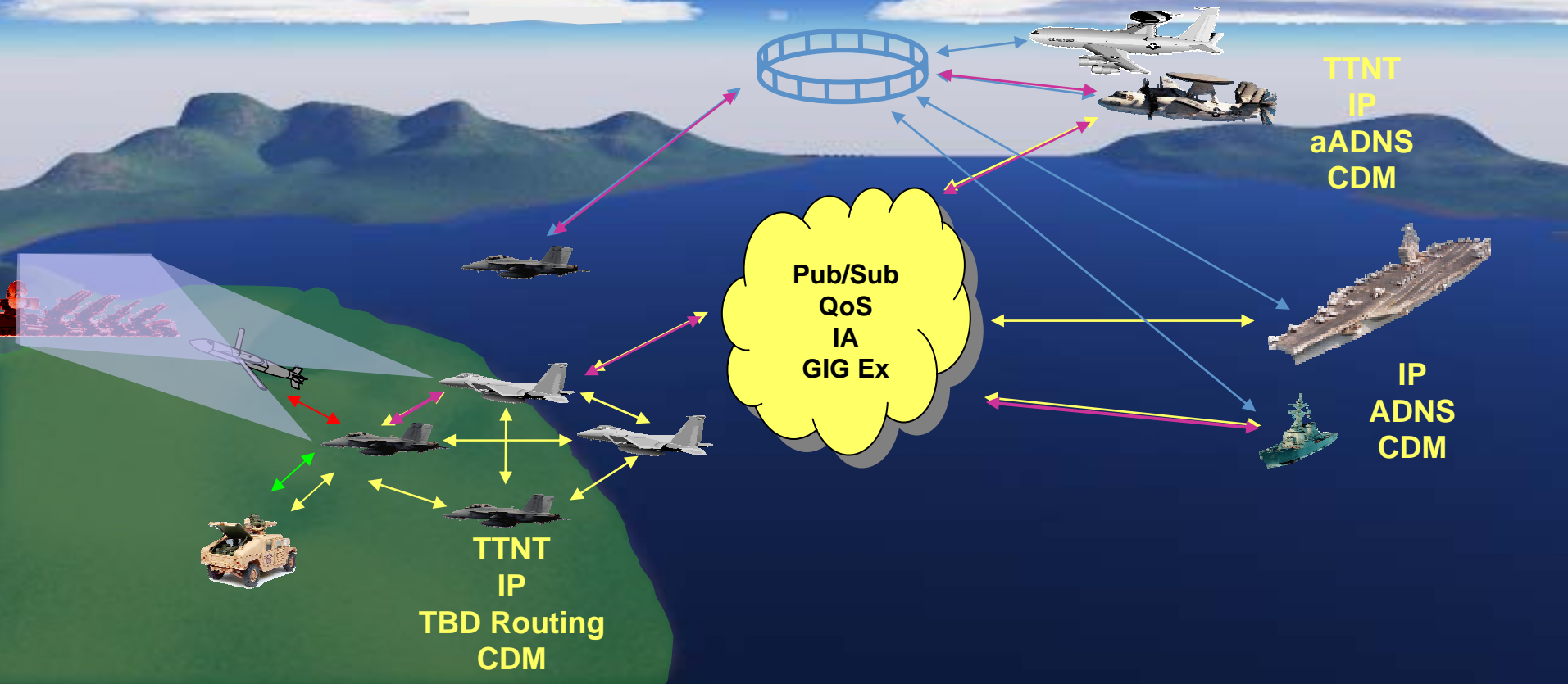
TEN Layout

Legend:
Link-16 Data and J-voice
VMF Digital Messaging
Weapons Data Link
TEN Connectivity:
Radio/Waveform/Routing/Common Data Model (CDM)

TTNT
IP
aADNS
CDM

Pub/Sub
QoS
IA
GIG Ex

IP
ADNS
CDM

TTNT
IP
TBD Routing
CDM

Naval Aviation Transition Strategy

❑ Continue evolutionary upgrades for Naval Aviation platforms
- Link-16, VMF proliferation
- Hardware evolution
  - AN/ARC-210 upgrades and early MIDS-JTRS increments bridge the gap
- Continue refinement of ongoing IP-based solutions
  - aADNS, HF IP, VMF

❑ Further define Tactical Edge Networking requirements
- Employ systems engineering process

❑ Identify Science and Technology Investment Opportunities
- Network Services study and refinement to raise maturity level

❑ Leverage Joint Capabilities Technology Demonstration (JCTD)
- Develop tactical edge network services
- Demonstrate full networking capability in focused warfighting environment
  - Collaborate with joint Services
  - Compatible with Network Centric Enterprise Services (NCES)
  - Common across service / platform boundaries

❑ Continue work with N71 on NCDP for TEN